CLAIMS

What is claimed is:

1. A synthetic chemokine comprising a chemokine polypeptide chain having an N-terminus and a C-terminus, said chemokine polypeptide chain comprising (i) an amino acid sequence and cysteine pattern corresponding to a wild type chemokine, and (ii) a C-terminal truncation relative to said wild type chemokine.

2. The synthetic chemokine of claim 1, wherein said N-terminus comprises amino acids of said chemokine polypeptide chain that are N-terminal to the first disulfide forming cysteine of said chemokine polypeptide chain.

3. The synthetic chemokine of claim 1, wherein said C-terminus comprises amino acids of said chemokine polypeptide chain that are C-terminal to the last disulfide forming cysteine of said chemokine polypeptide chain.

4. The synthetic chemokine of claim 3, wherein said C-terminus comprises a core helix region, and said truncation is C-terminal to said core helix region.

5. The synthetic chemokine of claim 1, wherein said truncation comprises a deletion of one or more amino acid residues having a polar or charged side chain relative to said wild type chemokine.

6. The synthetic chemokine of claim 5, wherein said amino acid residues having a polar or charged side chain are selected from arginine, lysine, aspartic acid, and glutamic acid.

7. The synthetic chemokine of claim 5, wherein said synthetic chemokine is in an oligomeric state consisting substantially of a monomer.

8. The synthetic chemokine of claim 5, wherein said synthetic chemokine is in an oligomeric state consisting substantially of a dimer.

9. The synthetic chemokine of claim 1, wherein said chemokine polypeptide chain comprises one or more amino acid residues that differ from an amino acid residue at a corresponding position in said wild type chemokine.

10. The synthetic chemokine of claim 9, wherein said chemokine polypeptide chain is modified at its C-terminus with one or more amino acid residues that differ from an amino acid residue at a corresponding position in said wild type chemokine.

11. The synthetic chemokine of claim 11, wherein said C-terminus is capped with an amino acid of the formula –NH-CH(R)-C(O)-NH_2, where R is an amino acid side chain that is the same or different from the side chain of the amino acid in said wild type chemokine.

12. The synthetic chemokine of claim 9, wherein said chemokine polypeptide chain is modified at its N-terminus with one or more amino acid residues that differ from an amino acid residue at a corresponding position in said wild type chemokine.

13. The synthetic chemokine of claim 12, wherein said chemokine polypeptide chain is modified at its N-terminus with a hydrophobic aliphatic chain.

14. The synthetic chemokine of claim 13, wherein said N-terminus is capped with an amino acid of the formula J-X–NH-CH(R)-C(O)-, where R is an amino acid side chain that is the same or different from the side chain of the amino acid in said wild type chemokine, X is a linker, and J- is said hydrophobic aliphatic chain.

15. The synthetic chemokine of claim 14, wherein X comprises an amino acid derivative.

16. The synthetic chemokine of claim 14, wherein J comprises the formula CH_2-$(CH_2)_n$-, where n = 0 to 20.

17. The synthetic chemokine of claim 1, wherein said chemokine polypeptide chain is covalently modified with one or more polymers.

18. The synthetic chemokine of claim 17, wherein said polymer is linear.

19. The synthetic chemokine of claim 17, wherein said polymer is branched.

20. The synthetic chemokine of claim 17, wherein said polymer comprises an ethylene oxide repeat unit of the formula -CH_2-CH_2-O-.

21. The synthetic chemokine of claim 20, wherein said polymer comprises polyethylene glycol.

22. The synthetic chemokine of claim 20, wherein said polymer comprises a polyamide.

23. The synthetic chemokine of claim 17, wherein said polymer comprises a fatty acid.

24. The synthetic chemokine of claim 1, wherein said chemokine polypeptide chain comprises an amino acid sequence that is substantially homologous to the amino acid sequence of said wild type chemokine.

25. The synthetic chemokine of claim 24, wherein said wild type chemokine is a CC Chemokine.

26. The synthetic chemokine of claim 24, wherein said wild type chemokine is a CXC Chemokine.

27. The synthetic chemokine of claim 1, wherein said wild type chemokine is selected from the group consisting of Rantes, MIP1α, MIP1β, or MCP-1.

28. The synthetic chemokine of claim 1, wherein said chemokine polypeptide chain comprises an amino acid sequence of a SEQ ID NO:1.

29. A composition comprising a synthetic chemokine having an amino acid sequence depicted in SEQ ID NO. 1.

30. A composition comprising a synthetic chemokine selected from the group consisting of NK1, NK2, NK3, NK4, NK5, NK6, NK7, NK8, NK9, NK10, NK11, NK12 and NK13.

31. The synthetic chemokine of claim 1, wherein said chemokine polypeptide chain is produced by chemical synthesis.

32. The synthetic chemokine of claim 31, wherein said chemical synthesis comprises the chemoselective ligation of non-overlapping peptide segments of said chemokine polypeptide chain.

33. The synthetic chemokine of claim 32, wherein said chemoselective ligation is native chemical ligation.

34. A pharmaceutical composition comprising a synthetic chemokine according to any one of claims 1, 29 and 30, or pharmaceutically acceptable salts thereof.

35. The pharmaceutical composition according to claim 34, which comprises one or more excipients selected from the group consisting of a buffer, a carrier protein, an amino acid, a detergent, a lipid, a water-soluble polymer, and a preservative.

36. The pharmaceutical composition according to claim 34, which comprises one or more additional bioactive agents other than said synthetic chemokine.

37. A method of treating a disease state in mammals that is alleviated by treatment with a chemokine receptor antagonist, said method comprising administering to a mammal in need of such a treatment a therapeutically effective amount of a synthetic chemokine according to any one of claims 1, 29, and 30.

38. The method of claim 37, wherein chemokine receptor is down regulated as a result of binding of said synthetic chemokine to said chemokine receptor.

39. The method of claim 37, wherein the mammal has a disorder selected from the group consisting of AIDS, psoriasis, multiple sclerosis, cancer, asthma, allergic rhinitis, atopic dermatitis, atheroma, atherosclerosis, or rheumatoid arthritis.

40. The method of claim 39, wherein said disorder in the mammal is incident to a therapy selected from the group consisting of antiviral therapy, psoriasis therapy, multiple sclerosis therapy, cancer chemotherapy, asthma therapy, allergic rhinitis

therapy, atopic dermatitis therapy, atheroma therapy, atherosclerosis therapy, and rheumatoid arthritis therapy.

41. The method of claim 40, wherein the synthetic chemokine is administered before, concurrently with, or after said therapy.

42. A method of producing a synthetic chemokine in a substantially purified oligomeric form, said method comprising:

synthesizing a protein pool containing a synthetic chemokine protein comprising a chemokine polypeptide chain having an N-terminus and a C-terminus, said chemokine polypeptide chain comprising (i) an amino acid sequence and cysteine pattern corresponding to a wild type chemokine, and (ii) a C-terminal truncation relative to said wild type chemokine; and

purifying from said protein pool one or more oligomeric forms of said synthetic chemokine protein so as to produce a synthetic chemokine in a substantially single oligomeric form.

43. The method of claim 42, wherein said single oligomeric form is selected from the group consisting of monomer and dimer.

44. The method of claim 42, wherein said synthetic chemokine protein is covalently modified with one or more polymers.

45. The method of claim 42, wherein said synthesizing comprises chemical synthesis.

46. The method of claim 45, wherein said chemical synthesis comprises the chemoselective ligation of non-overlapping peptide segments of said chemokine polypeptide derivative.

47. The method of claim 46, wherein said chemoselective ligation is native chemical ligation.

48. A kit comprising in a container a chemokine polypeptide derivative of any one of claims 1, 29 and 30.